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Managing Risk in Your Program

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Risk Analysis

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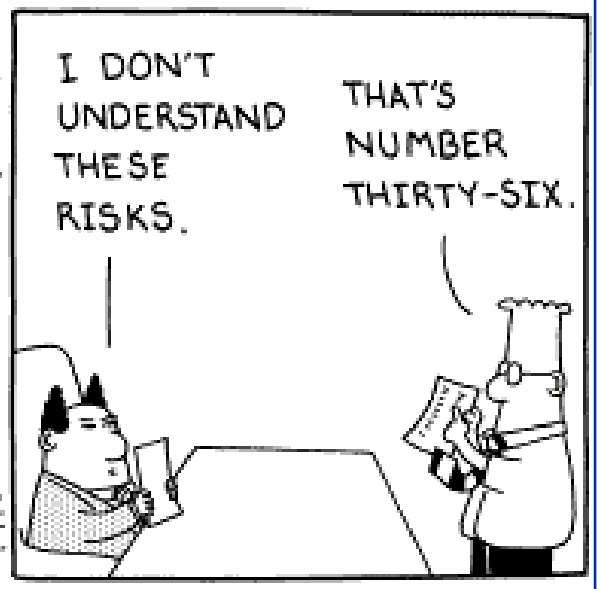

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Edwards Acquisition Center of Excellence

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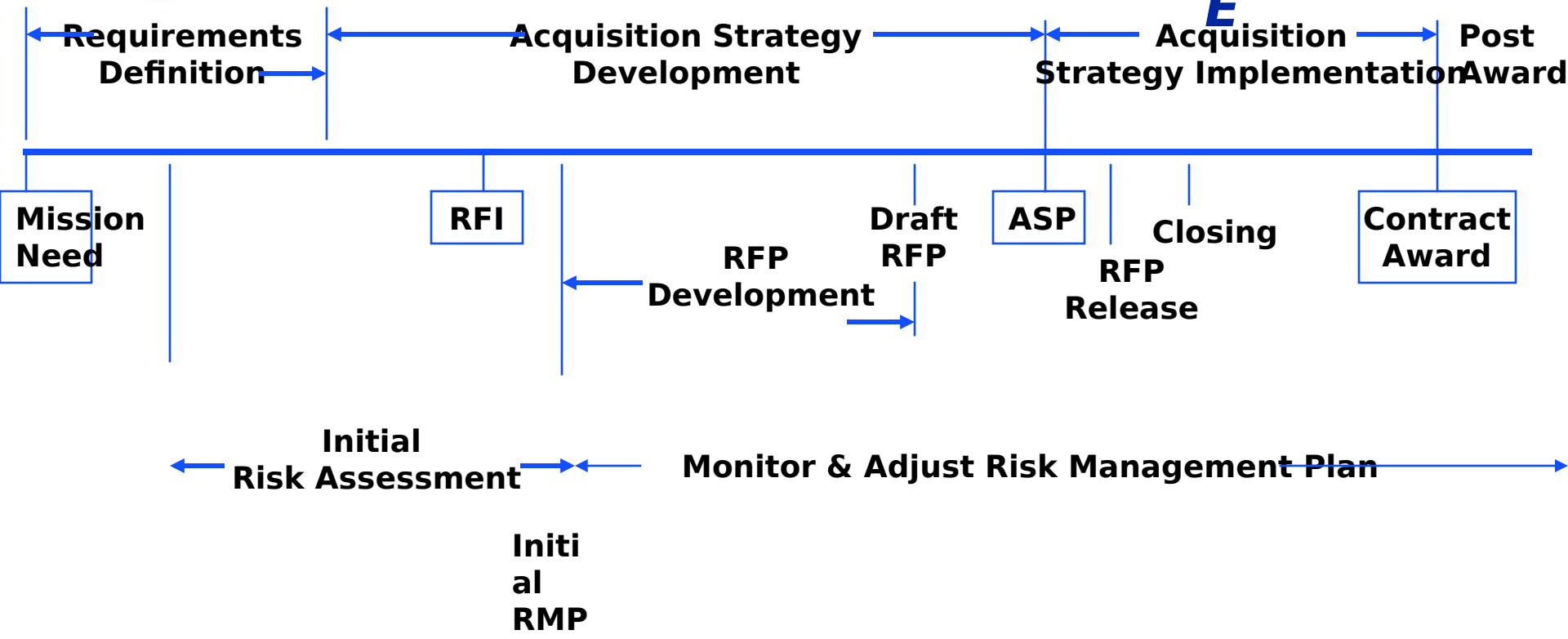
- **Agile Acquisition: Reduced cycle times**
- **“Agents of Change”: Identify regulatory or policy roadblocks and help get them waived or eliminated**
- **AFFTC ACE facilitates your acquisition**
  - **Communication to the SAF level (non-attribution)**
  - **Source selection resources**

Edwards ACE Program Process



Essentials for Success

- **Form an empowered, dedicated Integrated Product Team (IPT)**
  - **Risk Management as sub-IPT**
  - **Functional Area, Contracting, Finance, Facilities**
- **Allow enough time to think ahead**
  - **Start early**
    - » **Think about RM as soon as Need is identified**
  - **Block out your time**
    - » **Amount determined by size, complexity, risk-level**

Communicating early and often mitigates risk!!!

Risk Management Background

- Acquisition Managers required to continually assess program risks
- PMs required to integrate risk management within overall program management
- Acquisition Plans must identify program risks and how they are to be managed

A "test & evaluation" project is part of a program-level risk mitigation strategy!

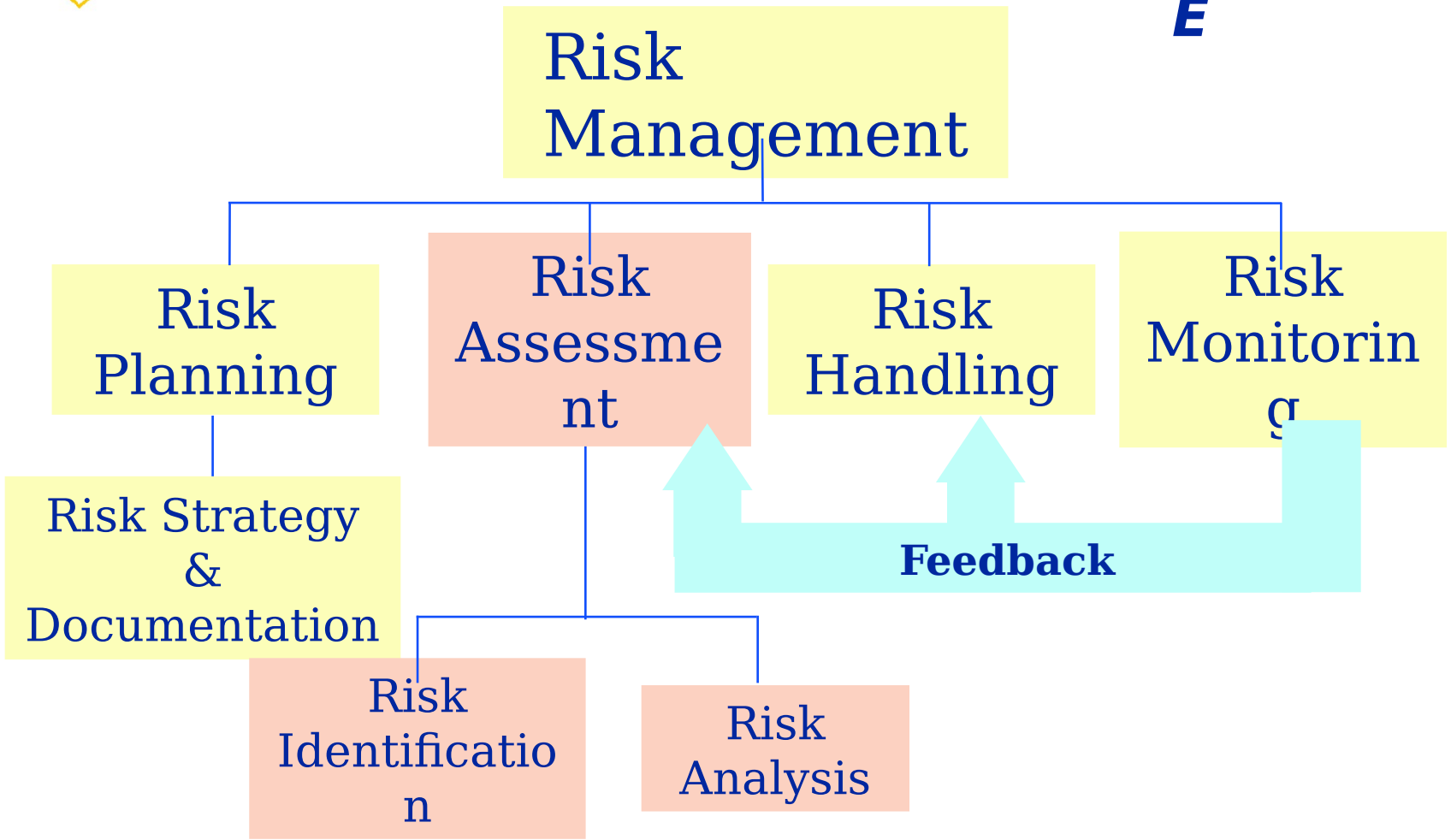
Risk Definition

- **Risk**: "A measure of the inability to achieve program objectives within defined cost and schedule and safety constraints, due to one or more undesirable events."
- **Two Components of Risk**:
  - *Probability* of failing to achieve an outcome
  - *Consequence* of failing to achieve that outcome

Risk Management

" **Risk Management** encompasses identification, mitigation, and continuous tracking and control procedures that feed back through the program assessment process to decision authorities." **DoDD 5000.1**

Risk Management Structure



Risk Planning

Risk Management Plan (RMP):

- Describe the program
- List the members and stakeholders
- Describe the risk management process:
  - How you will identify, analyze, develop handling plans, and monitor?
  - What tools and processes will be used?
- Detail when RMP is to be updated

Risk Planning [cont'd]

- **Risk Monitoring:**
  - **Program metrics:**
    - » **Process measurements evaluating how well the system development process is achieving its objective**
      - » **For example: PMR metrics, milestones, acquisition phase exit criteria**
  - **Technical Performance Measures:**
    - » **Essential performance parameters**
      - » **For example: performance trade space, engineering processes**

Risk Planning [cont'd]

- **Risk Monitoring (cont'd):**
  - **Cost and schedule:**
    - **Earned Value Management - periodic comparisons of actual work accomplished with work planned and budgeted**

You can't manage what you don't see!

Risk Planning [cont'd]

Risk Management Plan (RMP):

- **RMP is a living document: attach risk assessments/reassessments, process changes, record of activities and decisions**

- **Resource:**
  - **AFMC HQ Gameboard**
    - **https://afkm.wpafb.af.mil/ASPs/Gameboard/**
      - **"Risk Management" tile**
  - **Knowledge Now**
    - **https://afkm.wpafb.af.mil/ASPs/CoP/**

Risk Assessment:

- **Risk Identificatior**
- **Risk Analysis**

Sources of Risk
Internal

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- Technical
  - Maturity
  - Customer (User) Uncertainty
  - Changing Requirements
  - Complexity/Dependency
  - Design Errors, Omissions,
  - Processes (tech, mfg, s/w)
- Schedule
  - Unrealistic Requirements
  - Capabilities Optimism
  - Type (Time vs Event Based)
  - Incomplete ID of Tasks
- Cost
  - Uncertain Number of Products
  - Competitive Environment
  - Design & Config. Changes
  - Data
- Management
  - Lack of Succession Planning
  - Lack of Leadership Support (Internal Advocacy)
  - Personal Agendas
  - Personality Conflicts
  - Missing Functional Representation
  - Lack of Timely, Effective Training

Sources of Risk
External

- Political Actions/Funding
- Company Stability
- Lack of Competition
- Personnel
- Occupational
- Labor Actions
- Physical Damage
- Criminal
- Data
- Supplier Viability
- Regulations
- Terrorism
- Climate/Environment
- Priority
- Transportation
- Maintenance

Risk Identification

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- Over the life of the program
  - What things could go wrong?
  - What would cause that to happen?
  - Include ALL possible negative events
- State as negative event
  - Use nouns and verbs in statements
  - Don't just list topics
- Use IF/THEN or THEN/IF statements
  - Program objective will not be met due to ktr not having effective management controls
  - If ktr does not have effective management controls, program objective will not be met

Risk Identification

- **Req: My family will vacation on a S.P.I. 1st week of Aug**
  - **Risk: Hurricane hits S.P.I. 1st week of August**
    - **Probability: 1%**
    - **Consequence: MODERATE?**
      CRITICAL?
- **Req: My family must have a safe vacation on S.P.I. 1st week of Aug**
  - **Risk: Family will be injured due to a hurricane hitting S.P.I.**
    - **Probability: 1% X 20% = 0.2%**
    - **Consequence (Performance): CRITICAL**
- **Req: Vacation must be 1st week of Aug**
  - **Risk: Vacation canceled due to hurricane**
    - **Probability: 1% X 100% = 1%**
    - **Consequence (Schedule): SERIOUS**
    - **Consequence (Cost): MINOR**

Probability Ratings

Probability of risk becoming reality:

- **Doubtful -** (0 - 10%) **Know this most likely will not occur**
- **Unlikely -** (11 - 40%) **Believe this will not occur**
- **Chance -** (41 - 60%) **Toss-of-coin**
- **Likely -** (61 - 90%) **Believe this will occur**
- **Sure -** (91 - 100%) **Know this most likely will occur**

Consequence Ratings

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Resolution requires which level attention?

- **Negligible**: Work-a-day issues and problems
- **Minor:** PM/PM toe-to-toe, User concerned, programmatic workarounds required, slip of weeks, cost increase over 10%
- **Moderate**: SPD/VP involvement, Many user tactic workarounds, few month slip, cost increase over 25%
- **Serious**: SSA-PEO/Pres involvement, Severe mission impact, Multi-month schedule slip, Cost increase over 50%
- **Critical:** SSA-PEO/CEO involvement, Mission failure, Program cancelled or major restructure

Define Analysis Levels

3-Level Consequence Example

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Level	Consequence Categories		
	Technical	Schedule	Cost
High	Does not meet operational requirements	>6 mo. Slip	>$200K or >25%
Med	Will not meet operational rqmts. in near future	3-6 mo. Slip	$50-200K or 10-25%
Low	Barely meets operational requirements.	< 3 mo. Slip	< $50K or <10%

- **Consider using additional consequence categories; analysis is not limited to technical, schedule and cost**

Risk Analysis Example

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Risk Prioritization: Purpose

- **Why is Prioritization important?**
  - **Limited time**
  - **Limited resources**
  - **Oversight to insight**
  - **Apply efforts appropriate to level of risk**
    - » **Pareto Principle (80 / 20 rule)**

Risk Handling

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Risk Management Plan

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1. State the program requirements
2. Identify risks associated with the requirements
3. Analyze each risk to determine its:
   - Probability of occurring
   - Consequence to the program if it occurred
4. Assign overall rating (High/Moderate/Low) to each risk as a function of Prob. & Cons.
5. Prioritize Risk
6. Develop a Handling Plan:
   - Assume “Low” risks
   - Mitigate “High” risks and as many of the “Moderate” risk as resources permit

Risk Handling

Typical risk handling strategies:

- **Avoid** risk by changing requirements
- **Transfer** the risk (another party/stage)
- **Control** the risk through active steps
- **Assume** the risk without special efforts

Most large programs incorporate all of them.

Risk Handling

- **Risk Avoidance:**
  - Change in concept , requirements, or practices
  - Eliminates sources of high risk and replaces them with a lower risk solution
- **Risk Transfer:**
  - Redistribute risk between stakeholders
  - Reallocate risk from one part of a system to another
- **Risk Control:**
  - Active mgmt of risk; doesn't eliminate source of risk

Risk Handling

- **Risk Assumption:**
  - **Conscious decision to accept risk**
  - **Appropriate for risks rated “Low”**
  - **MAY be appropriate for higher rated risks, if worth the benefits**

Risk Handling Plan Example

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RISK	PRE	APPROACH	POST
C8A – Contractor has ineffective Program Management, requiring excessive Gov't Oversight	M	• RFP Discriminator: Proposal and TMP evaluated for effective program management. • Incentivize through Award Fee or Incentive Fee in contract structure	L
P9A – Contractor does not perform adequate testing due to financial contraints P10A – Contractor does not provide updates to the Performance Specification due to financial contraints.	M	• Program can shift resources to complete testing or specification validation • RFP Discriminator: Scrutinize cost mgt & cost realism in proposal and cost mgt in past performance.	L
P10B – Contractor does not update Performance Spec due to poor contract performance / lack of technical ability	M	• RFP Discriminator: devise and deploy targeted past performance questionnaires and review CPAR data. • RFP Discriminator: Technical Experience and Technical Approach (technology, risk, design, proposal)	L

Do you think they have a contingency plan?

Risk Handling

- A **contingency** is a possible future event or condition or an unforeseen occurrence that may necessitate special measures
- A **contingency plan** documents the special measures to be taken if the event occurs (esp. for your identified high-level risks)
- **Example:**
  - **A contingency plan to evacuate your home and call 911 is not an active measure that mitigates the risk of a home fire, but is a reactive measure to be taken in the event of one.**

Driving into the Bushes

Risk Handling Plan (Acquisition Strategy)

- **Risk handling techniques in acq. strategy:**
  - **Market research**: vital tool to identify risk reducing opportunities (e.g., lower risk design approaches, commercial opportunities, competition)
  - **User/ktr involvement**: greater involvement drives risk down (e.g., have users/ktrs involved in requirements definition, cost/performance trade-offs, risk mgmt, get feedback through RFIs, draft RFPs, and Industry Days, share data/lessons learned with contractors)

Risk Handling Plan (Acquisition Strategy)

- **Risk handling techniques in acq. strategy:**
  - **Competition**: maintaining competition as long as possible during program phases can lower risk (e.g., ktr that can better mitigate risk rises to top, ktr assumes more risk)
    - **No. of Contracts: 3(PDRR) + 2 (EMD) + 1 (Production)**
  - **Commerciality:** use of commercial products/services drives down schedule, cost, and performance risks
  - **Contract incentives:** in cost-plus contracts, ktr realizes higher fee/rate of return by decreasing costs or by meeting high risk performance targets; second sourcing; sharing cost savings w/ prime and subs

Risk Handling Plan (Acquisition Strategy)

- **Contract Types (Incentives)**
  - **Firm Fixed Price (FFP): typically used for lower risk efforts where** requirements are well defined and costs can be accurately estimated). The contractor assumes the bulk of the risk.
  - **Cost Reimbursement: typically used for high risk efforts where requirements and costs are uncertain (e.g. research; test & evaluation; and dynamic range support services contracts).** Govt. assumes the bulk of the risk - benefiting, if actual cost lower than expected; losing, if work not completed within expected cost.
  - **Incentive Types**
    - **Fixed Fee: stable rate of fee for low to moderate risk efforts**
    - **Incentive Fee: fees tied to targeted efficiencies realized (e.g. milestone accomplishment, cost savings, cross-utilization achieved, etc.)**
    - **Award Fee: fees tied to subjective performance criteria (e.g. innovative management techniques used,**

Risk Handling Plan (Acquisition Strategy)

- **Initial documents:**
  - **SOO key objectives:** develop objectives that drive down risks (e.g., require ktr cost control reporting system, risk mgmt plan)
  - **RFP discriminators**: drive ktr approach to lower risk and select low risk ktr (e.g., ktr develop risk mgmt plan; if integration high risk, select ktr based on ability to work integration issue)
    - **Discriminators should mitigate high program risks**

Risk Handling Plan (Acquisition Strategy)

- **Source selection is a process of discrimination:**
  - **All offerors come into the process on an equal footing**
  - **If source selection is properly structured and conducted:**
    - **Offerors who have superior ideas, excellent past performance, or are low risk will rise to the top**
    - **Offerors who are clearly over their heads, are risky, don't understand your requirements, or are inexperienced will drop to the bottom**
    - **Offerors who are OK or mediocre, will be in the middle**
  - **Worst case for source selection - all offerors rated the same:**
    - **Evaluation criteria not good discriminators, or**
    - **Min. requirements set too low or too high, or**
    - **Better market research or clearer requirements needed**

Risk Handling Plan (Acquisition Strategy)

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- **Source Selection Techniques:**
  - » **Lowest Price**
    - Low program risk/clearly defined requirements
  - » **Lowest Price/Technically Acceptable (LPTA)**
    - Low technical risk
  - » **Performance/Price Tradeoff (PPT)**
    - Little opportunity for technical innovation
  - » **Full Trade-Off (FTO)**
    - Technical risk + performance risk

	Price Proposal	Past Performance	Mission Capability	Risk
– **Low Price**		√		
– **LPTA**	√	+/-	+/-	
– **PPT**	√		√	+/- +/-
– **FTO**	√		√	√ √

Driving into the Weeds

USAF Mandated Evaluation Factors (Full Trade-Off--FTO)

- **Mission Capability**
  - Evaluation of offeror's proposal against the Gov.'s minimum performance or capability requirements
- **Proposal Risk**
  - Assessment of risks and weaknesses associated with offeror's proposed approach
- **Past Performance (Performance Risk Assessment Group—PRAG)**
  - Assessment of the degree of confidence the USAF has in an offeror to provide products or services that meet the users' needs (including cost and schedule) based on demonstrated record of performance
- **Price or Cost**
  - Assessment of affordability. Establish

Typical Mission Capability Subfactors

- Management:
  - Focuses on mgmt processes which will become part of subsequent contract, rather than resumes and org charts
  - Sound and realistic process demonstrates understanding of Gov. requirement
- Technical
  - Focuses on design approaches; analysis of trade-offs important
- Experience
  - Demonstrates offeror's capabilities
  - Mitigates risk of inexperienced ktr
  - Focuses on specificity of experience rather than amount
  - Can drive teaming arrangements; creates new risks typically mitigated by experience requirement of prime as

RFP Discriminators

- **Steps to development of effective FTO discriminators:**
  - **Develop, through risk analysis, criteria that addresses high program risks**
  - **Develop, through market research, min. capability or performance value to apply to criteria:**
    - » **Know capabilities of potential offerors**
    - » **Set min. too high, everyone fails; too low, everyone passes**
  - **Determine how min. value can be exceeded in a beneficial way, and how it can be captured by the Government**
- **Performance-Price Tradeoff (PPT) Discriminators:**
  - **Developed same way as for Full Trade Off (FTO)**
  - **No exceedance allowed; pass/fail only**

RFP Discriminators (Cont'd)

- **Discriminator Example: Systems Integration**
  - **Requirement: Design must fully integrate with existing associated systems**
  - **Risk: Contractor's design doesn't properly integrate with other systems - HIGH**
  - **Discriminator:**
    - » **Technical: Must propose a sound, realistic approach to systems integration for their design**
      - **Strength (Exceedance): Innovative, highly effective approach**
    - » **Past Performance: How well did they perform systems integration on relevant past and current contracts?**
      - »PRAG course

Section L & M Example

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Sec M, Subfactor 1: "The offeror has demonstrated an acceptable level of understanding of the program requirements when it presents a management approach that is **efficient** and **effective**, while **proactively managing** cost/schedule/performance and risks in accordance with sound business practices. The approach must provide both contractor and Gov. management **clear visibility** into cost, schedule, performance, testing, and logistics, as well as **clear visibility** into program risks, while **minimizing Gov. oversight and support**...."

Sec L, Past Performance Questionnaire:
" **(4)** Did the contractor proactively manage cost/schedule/performance and risks?"
" **(5)** Did the contractor provide clear visibility into program execution?"

Risk Monitoring

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Risk Monitoring Definition

- Continuous process that systematically evaluates all identified risk handling options
  - Input for Management decisions
  - Input to risk re-assessments
    - » Are there other risks previously unidentified?
    - » Have green or yellow risks gone to red?

Why Monitor Risk?

- Track changes in the likelihood a particular risk is about to occur
- Tracking the handling plan will indicate
  - Whether the plan is being executed correctly
  - If the plan is effective
  - Potential problems
- Software Tools
  - http://www.acq.osd.mil/io/se/risk_management/tools_and_products.htm

You can't manage what you don't see!

Risk Monitoring

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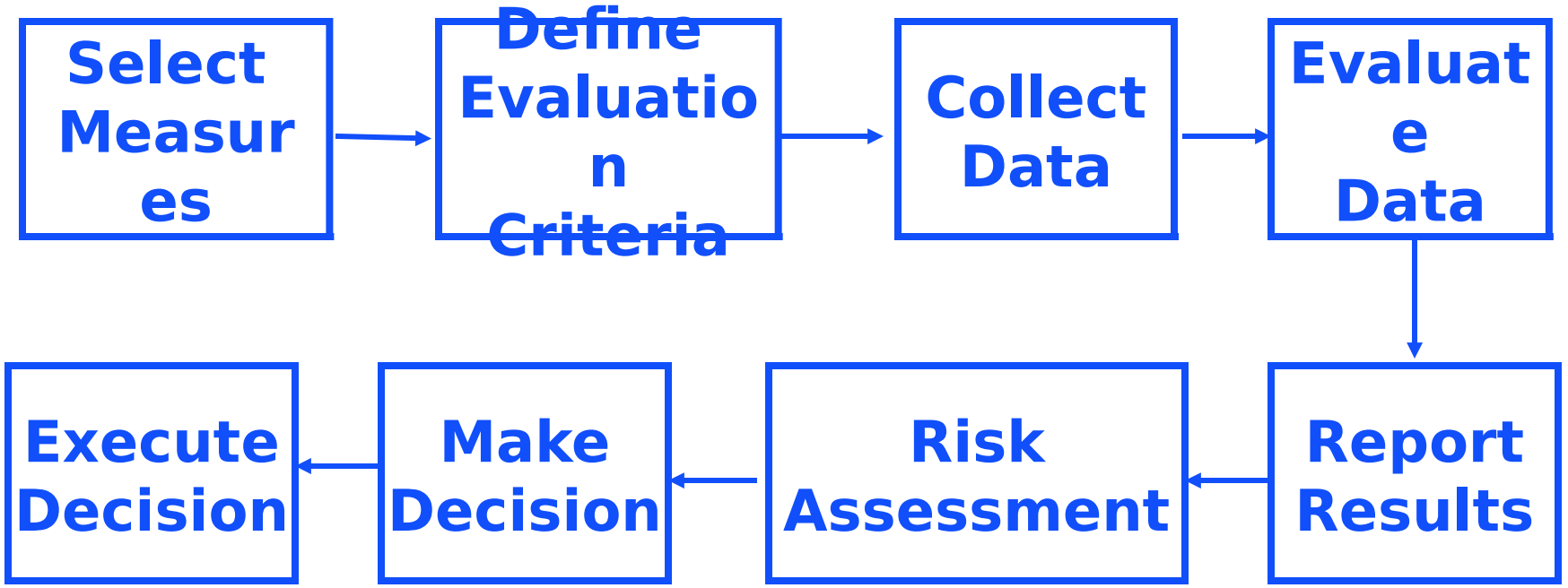
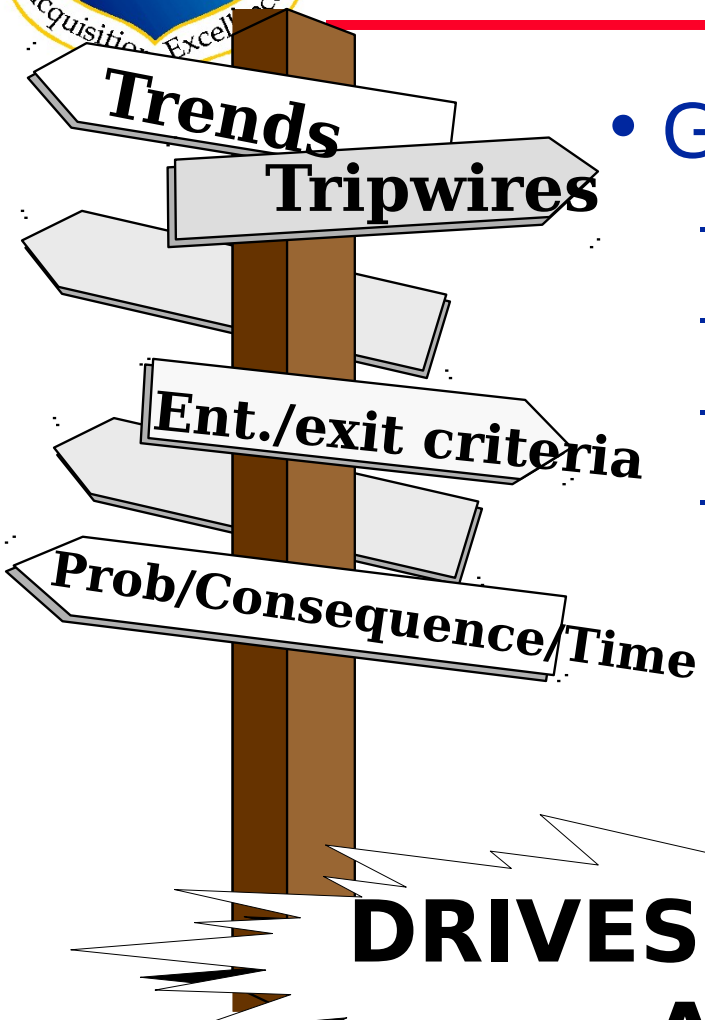


Select Measures



- Good measures show:
  - Where one is today
  - Where one was yesterday
  - Where one needs to be
  - Whether risk is reduced to an acceptable level?

DRIVES APPROPRIATE ACTION!!

Types of Measures

- Program Metrics
- Technical Performance Measures
- Cost and Schedule

Program Metrics

- Process measurements evaluating how well the system development process is achieving its objective
  - Measures program execution events rather than system performance
  - Provides process oversight/insight for:
    - » DoD (OSD)
    - » Service (AF, SAF/AQ, PEO)
    - » Command (AFMC)
    - » Center (Product, Depot, Test, AFRL)
    - » Program Director

Program Metrics

- Program Management
  - IMP/IMS execution, milestones, technical reviews
- PK Process
  - Draft RFP/RFP release, source selection execution, contract award, modification awards
- FM Process
  - POM submission, budget execution (obligation and expenditure rates), unliquidated obligations, negative unliquidated obligations

Technical Performance Measures

- Product design and performance assessment which estimates the values of essential performance parameters of the current design
  - Measurable
  - Meaningful planned profiles
  - Directly associated with risk or requirement

Technical Performance Measures

- Examples:
  - Performance **(speed, weight, range)**
  - Supportability **(MTTR, MTBF, modularity)**
  - Software **(processor throughput, size, defects)**
  - Producibility **(manpower, facilities, material)**
  - Eng Processes **(staffing, rework, yield, requirement stability, problems opened/closed)**
  - Affordability **(CAIV, life cycle costs)**
  - Logistics **(down time, fix and mission cap rate)**

Technical Performance Measures
Concept

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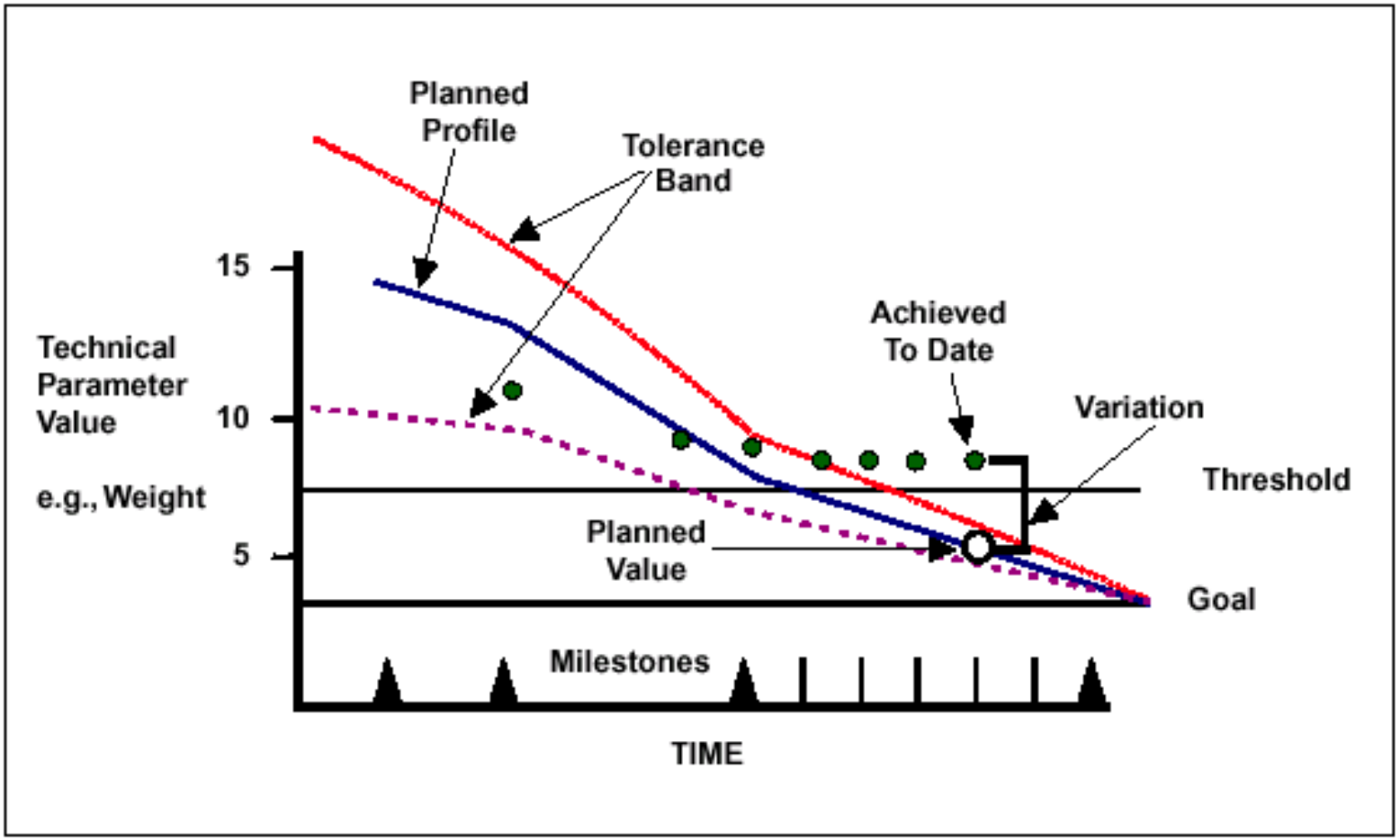

DSMC -- Systems Engineering Fundamentals; December 2000

Cost and Schedule

- Measures used to evaluate contractor (or in-house) performance in achieving objectives within cost and schedule constraints
  - Measures contract (or workload) execution
  - Used to analyze shortcomings
  - Used to identify and monitor risk areas

Cost and Schedule

- Earned Value Management
  - Periodic comparisons of actual work accomplished with work planned and budgeted
  - Combines cost, schedule, and performance
- Financial Reports
  - Used to monitor cost related risks/problems
- Schedule Analysis
  - Used to monitor schedule related risks/problems

Earned Value Management
Concept

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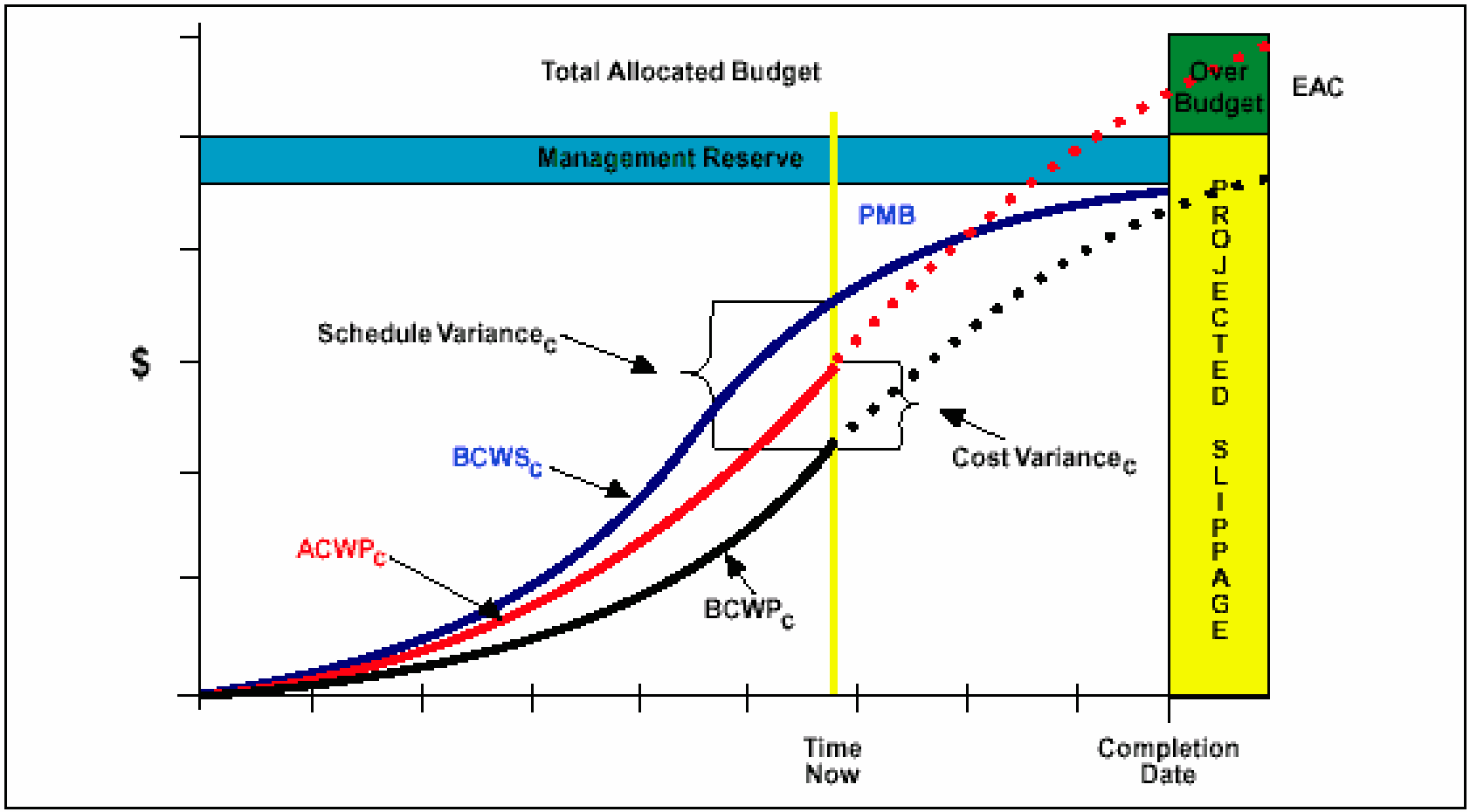

DSMC -- Systems Engineering Fundamentals; December 2000

Define Eval Criteria

- What is success?
- What is less than satisfactory?
- Program metrics
  - Contract award cycle time standards (contract milestones)
  - Obligation rate
- Technical Performance Measures
  - Planned profiles and tolerance bands
- Cost and Schedule
  - IMS (milestones and inchstones)

Collect Data

- Frequency?
- Who collects?
- Joint govt/contractor monitoring?
  - Key member of IPT (QAP/FAEs/Functional Specialists?)
  - Govt access to data/reports
- Contract data requirements?
  - Contract Data Requirements List (CDRL)
  - Contractor format or per Data Item Description
- Quality Assurance Surveillance Plan (QASP)?
- Service Delivery Summaries (SDS's)

Evaluate Data

- As expected, better, or worse?
  - What trends do metrics show?
  - What caused variance?
  - Is a risk re-assessment required?
    - Unknown risk?
    - Change in prob/consequence of identified risk?
    - Change in urgency?
- Have tripwires (thresholds) been tripped?

Report Results

- What to report?
  - Which risks?
    - » Watchlists
  - What format/level of detail?
  - Recommend action to management!
- To whom do you report?
- How often?

Sample Watchlist

Risk	Handling Action	POC	Date Listed
If Tech data pkg has many changes, then production costs will grow with high 1st unit cost and many ECPs to follow	• Require production engineers on KTR design team • Conduct incremental PCA • Compete FFP contract • Production Readiness Reviews	EN (Capt Smith)	1 Dec 01
If Government Furnished Equipment arrives late, then testing will be delayed	• Track status of GFE on regular basis • Determine best method for delivery (priority it necessary) • Track shipment until received	LG (Capt Jones)	1 Dec 01

ID #: 037 | **Title:** Data Sec Guard Accreditation | **Date Identified:** 14 Sept 01

Description: The Data Sec Guard is the device identified for the XYZ Program security architecture. The device is available now and can be procured in time for Alpha 4 and the IOC deployment, but it is not currently certified by the National Security Agency. Accreditation is expected to be complete prior to January 1, 2000. However, late certification could affect deployment of the XYZ Program IOC.

Originator: Mr Jones | **Assigned To:** Mr Smith (P) Mr Wesson (S)

Affected WBS "Third Level" Element: 1.3.1 *Systems Engineering*

Probability of Occurrence (0% - 10%, 11% - 40%, 41%-60%, 61% - 90%, 91% - 100%): 11%-40%

Impact/Consequence (negligible, minor, moderate, serious, critical): Serious

Risk Mitigation Plan: We will monitor the certification progress through the vendor. In parallel we will begin to coordinate the use of this guard with the accreditation officials at the using MAJCOM and primary user sites. To the extent that manual backup procedures can be planned in the event the guard is not certified, we will document those workarounds.

Sample Risk Information Sheet

Contingency Plan: We are evaluating the C2 Guard and will monitor the roll out of new Y2K compliant guards being approved by DISA or NSA.

Trigger: Failure to achieve NSA certification of the Data Sec Guard by January 1, 1999 - in time for the Y2K replacement of existing guards.

Status: Demonstrations of both guards are scheduled for late September. The contractor is continuing their market scanning and monitoring of guard certification activities to identify alternatives.

Approval:	**Closing Date/Rationale:**	**Risk Priority**
Ranking: 13		

Assess, Decide and Execute

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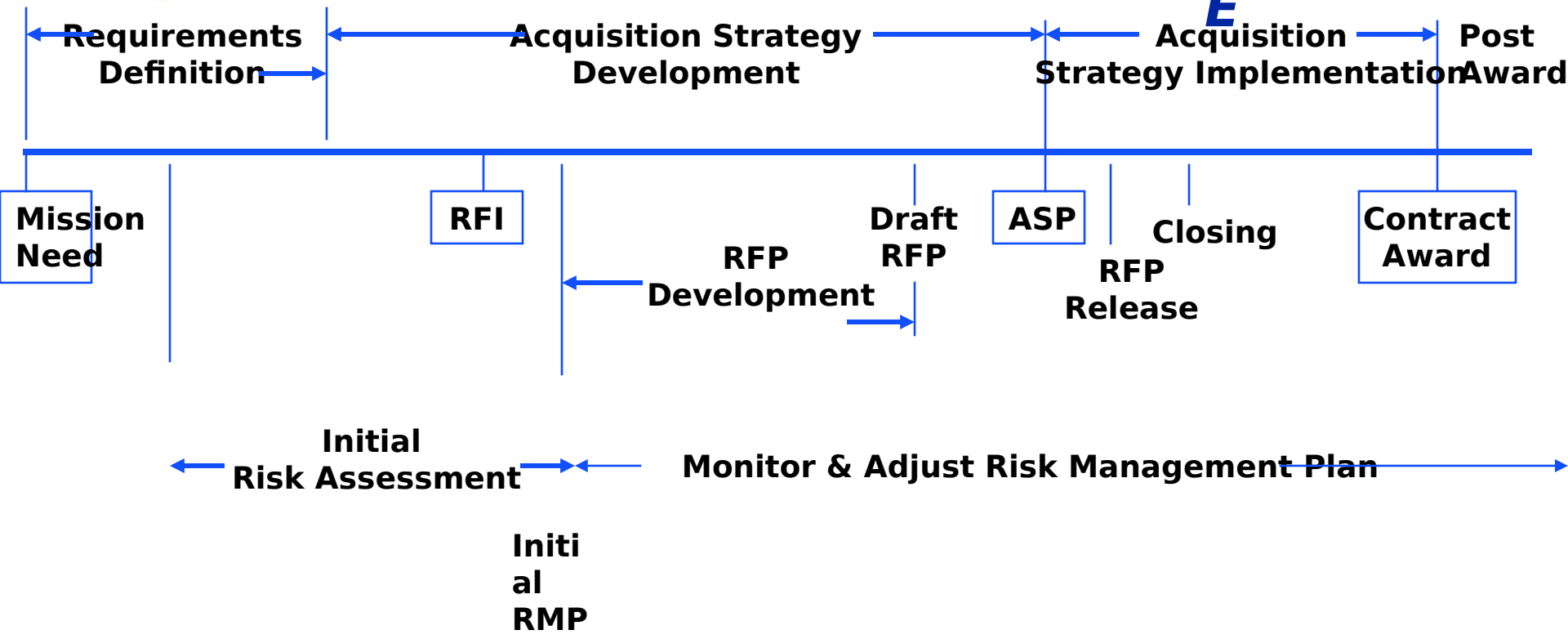
- Invoke Contingency Plan?
- Revise Handling Plan?
- No action, continue monitoring?
- Retire risk?
- Assess new risk(s)?
- Update cost estimate/schedules?
- Re-define requirements/objectives?

Edwards ACE Program Process



Risk Management Tools

- **Risk Assessment (using ‘P/CS’)**
  - **Annotations: Min, Max, Most Likely values for Schedule and Cost consequences**
- **Program schedule baselined (using ‘MS Project’)**
- **Schedule Assessment (using ‘RISK+’, plug-in to ‘Project’)**
  - **Min, Max, ML input from ‘P/CS’ and critical path items**
  - **Using Monte Carlo sim, generates total schedule risk as function of % confidence**
  - **e.g., 6 month schedule risk of slippage w/ 90% confidence**
- **Theory of Constraints (using Concerto)**

Summary

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- Risk Management is not just a block to “check off” in the Acquisition Plan or in the ASP. Your acquisition strategy is driven by it and must reflect it.
- Need to address risk: planning, assessment, handling, monitoring
- Source Selection is part of Risk Mitigation
- Identify risks over the life of the program, not just near term risks
  - IPT should reach consensus on adjectival definitions
- The MS ‘Project’ , Group Systems, P/CS or Risk Radar Software and other tools only as good as how it’s used; facilitators can help focus the team.

Teaming and Communicating Mitigates Risk

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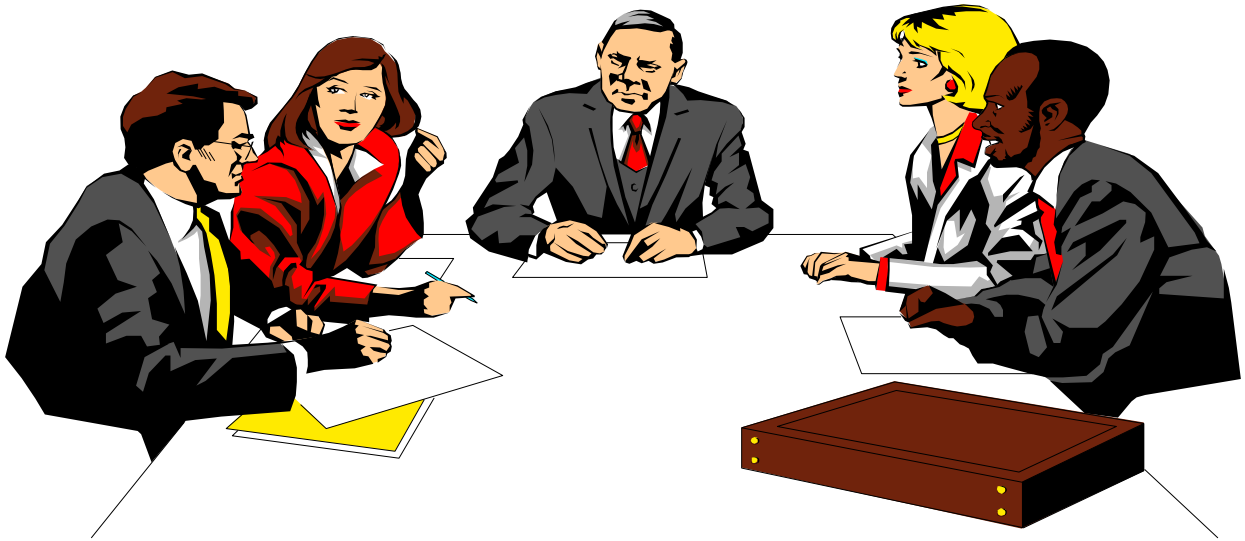

Risk Management is a contact sport!